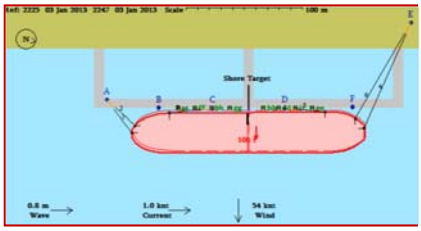
Final Project of a new berth for Bulk carriers in Santo Tomas de Castilla Harbor (Republic of Guatemala)

General data

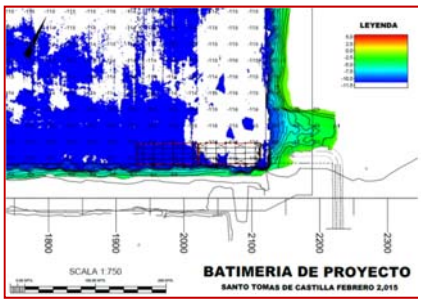
- ✓ *Years: 2016*
- ✓ *Customer: Logmarin (RINA group) for INTERPORT*

Final Project of a new berth for Bulk Carriers in Santo Tomas de Castilla (Republic of Guatemala), including breasting and mooring dolphins and a service catwalk

Area of the new berth for bulk carriers in Santo Tomas de Castilla Harbor



Force calculations in breasting and mooring dolphins (Optimoor program)



Bathymetric survey

Characteristics of the works

The new berth is located in the neighborhood of the existing harbor terminal inside an internal bay of the Amatique Bay, that is inside the Bay of Honduras. The location is not directly exposed to oceanic waves and the fetch is short. The new extension is located in an area of shallow waters at the border of the existing dock. Waiting for a final future arrangement of the harbor by the construction of a traditional quay similar to the existing one, the new berth consists of a couple of barges anchored parallel to the coastline, where the sea depth is about 8-9 m. In front of the barges, the sea bottom will be dredged up to about 13 m, to enable the berth of ships up to 55000 DWT with Displacement of 65000 t, which have a draft of 12.5 m. The barges have dimensions 90x30x6 m each with a scantling draft of 4.8 m. The minimum draft is about 1.5 m. The barges are rigidly connected along the short side, in order to obtain a unique vessel 180 m long and 30 m wide. It is moored by the help of five dolphins: four dolphins are located along the long side of the barge and the fourth one is located along the short side near the seaside angle. Each dolphin consists in a steel structure composed of three piles (about 40 m long) with an external diameter of 1067 mm at a distance of 4.0 m, linked at the top (elev. of +6.00 m) by welded beams. No service platforms will be provided at the top of these dolphins, because the maintenance can be assured from the top of the barge. The piles, however, are linked each other by three hollow sections. The piles will be drilled inside the sea bottom up to a depth of about 43 m. Each pile will be composed of a series of parts welded each other. The thickness of the pipes can vary according to the actual stresses in the range between 1" (25.4 mm) and 1.25" (31.75 mm). Metallic collars able to scroll vertically, in order to allow vertical motion, and to give a lateral restrain with the possibility of short displacements obtain the connection between the barge and the dolphin. Teflon or PE pads will reduce the friction between the collar and the piles. Two lines connect the vessel aft to the bollard B1 located at the top of a mooring dolphin R1 at el. +3.5 m; the ground is at el. +1.10 above sea level Low Tide. Two lines connect the vessel bow to the bollard B2 located in the sea on the top of the mooring dolphin R2 at el. +3.5 m; 2+2 stringer lines connect the side of the vessel to the bollards (B) located along the barge seaside. The stringers, that are parallel to the barge, link the vessel to the barge along the longitudinal direction. The berth system is completed by a series of fenders arranged along the seaside of the barge, by a series of bollards located along the edge of the barge. The aft mooring point consists in a bollard located on an existing pier at a distance of about 97 m; the bow mooring point is located on a new mooring dolphin at about 37 m away from the bow of the vessel. Mooring dolphins R1-R2 have service platforms at the top, where bollards are installed. The piles will be prefabricated in a yard located next to the final position.

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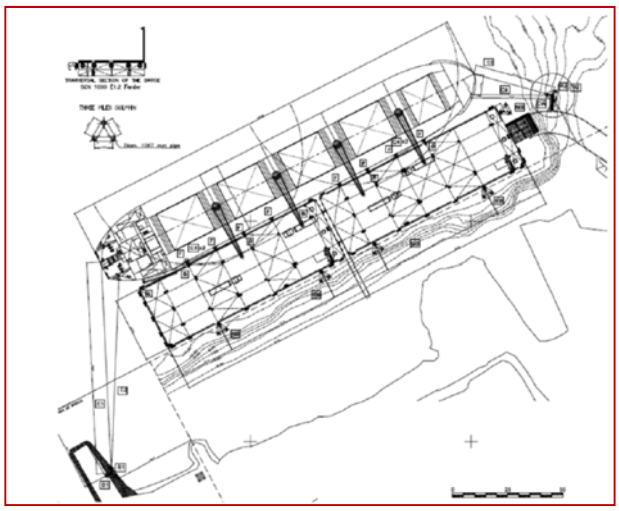
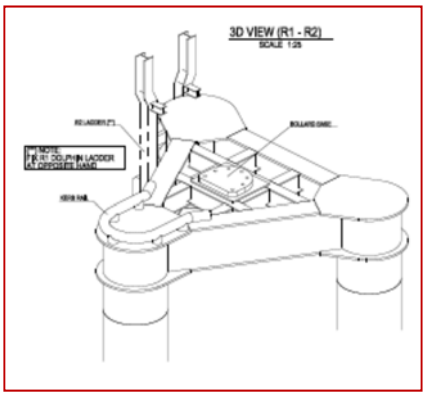
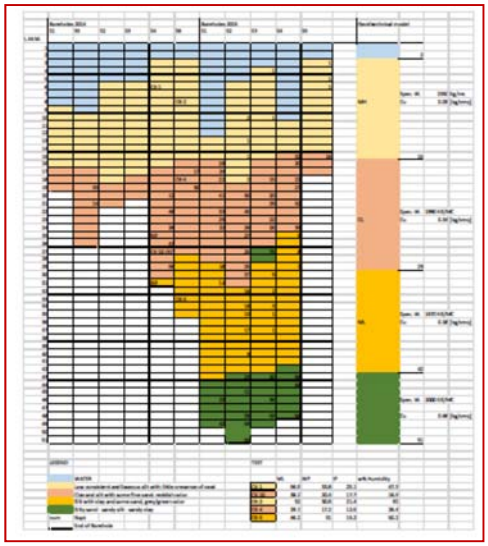


Layout of the new berth for bulk carriers



3D view of the top of a mooring dolphin
(3D Modelling by Tekla Structures)



Geotechnical model chart produced from surveys, used for the calculation of the piles of the dolphins.
A non-linear approach for soil-structure interaction has been adopted (Software GROUP – Ensoft)